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| 10/728,329   | 12/04/2003  | Daoqiang Lu          | P16918              | 7363             |
| 28062  | 7590        | 12/13/2005           | EXAMINER            |                  |
| BUCKLEY, MASCHOFF, TALWALKAR LLC<br>5 ELM STREET<br>NEW CANAAN, CT 06840 |             |                      | AFZALI, SARANG      |                  |
|  |             |                      | ART UNIT            | PAPER NUMBER     |
|  |             |                      | 3729                |                  |

DATE MAILED: 12/13/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

10/728,329

Applicant(s)

LU ET AL.

Examiner

Sarang Afzali

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 19 September 2005.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-12, 14-18 and 23 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-12, 14-18, and 23 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 04 December 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_.
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date: \_\_\_\_\_.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_.

**DETAILED ACTION**

***Response to Amendment***

1. The applicant's amendment filed on 9/19/2005 has been fully considered and made of record.

***Claim Rejections - 35 USC § 102***

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

3. Claims 1-3, 5-10, 12, 14-18 are rejected under 35 U.S.C. 102(b) as being anticipated by Farnworth (US 5,739,050).

As applied to claim 1, Farnworth in disclosing a method for assembling a semiconductor package teaches of a chuck (assembly tool 32 including compression arms 80, 82) picking up a clip (bridge clamp 24 with spring 22) and while chuck (32) is holding the clip (24), it picks up the IC die (14) (Figs. 6A-B).

As applied to claim 2, Farnworth teaches the use of vacuum through vacuum conduit (76) to pick up IC die (14, Figs. 6A-B).

As applied to claim 3, the vacuum is applied through the vacuum conduit (76) to the die (14) via an aperture (opening 66) in the clip (24) (Fig. 6B).

As applied to claim 5, Farnworth teaches that chuck (32) places the clip (24) and the IC die (14) into juxtaposition with heat spreader (20, Fig. 6B). Note that the pressure plate (20) is explicitly taught as being a heat spreader by reference "B", Wood

et al. (US 5,519,332), which is incorporated by reference in Farnworth (col. 4, lines 65-67).

As applied to claims 6 and 15, Farnworth further teaches that clip (24) and IC die (14) are released from the chuck (32) while the clip (24) holds the IC die (12) in contact with heat spreader (20, Fig. 6B).

As applied to claims 7 and 16, Farnworth further teaches that IC die (14) is bonded with heat spreader (20, Fig. 6B).

As applied to claims 8 and 17, Farnworth teaches that the clip (32) is removed and disengaged from the clip (24) and heat spreader (20, Fig. 6A).

As applied to claim 9, Farnworth teaches that the chuck (32) by means of vacuum transports the IC die (14) held to the heat spreader (20) by clip (24) before they are bonded (Fig. 6A, col. 5, lines 10-12).

As applied to claim 10, Farnworth teaches that IC die (14) and heat spreader (20) held by clip (24) are transported after they are released by the chuck (32, Fig. 6B).

As applied to claim 12, Farnworth teaches that chuck (32) simultaneously puts the clip (24) and IC die (14) into juxtaposition with the package substrate (12, Figs. 6A-B).

4. Regarding independent claim 14, as amended on 9/19/2005, since it recites the exact limitations of original claims 13 and 14 combined, therefore the Examiner maintains the same rejection arguments as was disclosed in an earlier office action mailed on 7/29/2005.

As applied to amended claim 14, Farnworth teaches that the apertures in the Chuck (32), clip (24) and heat spreader (20) are all aligned with each other thus allowing the vacuum to be applied through the vacuum conduit (76) to pick up the IC die (14, Figs. 6A-B). Farnworth further teaches that chuck (32) places the clip (24) and the IC die (14) into juxtaposition with heat spreader (20, Fig. 6B). Note that the pressure plate (20) is explicitly taught as being a heat spreader by reference "B", Wood et al. (US 5,519,332), which is incorporated by reference in Farnworth (col. 4, lines 65-67).

5. Regarding claim 18, as amended on 9/19/2005, the claim dependency is changed to amended claim 14 as oppose to the cancelled claim 13. Therefore, the Examiner maintains the same rejection as was disclosed in an earlier office action mailed on 7/29/2005.

As applied to amended claim 18, Farnworth teaches that the clip (24) is interposed between the IC die (14) and chuck (32, Fig. 6B).

### ***Claim Rejections - 35 USC § 103***

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

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7. Claims 4 and 23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Farnworth in view of Levert et al. (US 6,407,006).

As applied to claim 4, Farnworth discloses all claimed limitations except for the polymer material. However, Levert et al. discloses a method for integrated circuit planarization wherein a polymer pad (30) is used under a substrate (20) to prevent it from being damaged (Fig. 1, sec. 26, lines 3-6). It would have been obvious to one of ordinary skill in the art at the time of invention to modify Farnworth by using a polymer material for pressure plate (20) as taught by Levert et al. as an effective means to prevent damages to the IC die (14).

As applied to claim 23, Farnworth further teaches that chuck (32) places the clip (24) and the IC die (14) simultaneously (at the same time) into a juxtaposition (next to each other) with the heat spreader (20, Fig. 6B). Note that the pressure plate (20) is explicitly taught as being a heat spreader by reference "B", Wood et al. (US 5,519,332), which is incorporated by reference in Farnworth (col. 4, lines 65-67).

8. Claims 5-10 are alternatively rejected under 35 U.S.C. 103(a) as being unpatentable over Farnworth in view of Wood et al. (US 5,519,332). In the alternative, if applicant doesn't agree that Farnworth discloses a heat spreader, Wood et al. in teaching about a carrier for testing an unpackaged semiconductor die disclose the following:

As applied to claim 5, Wood et al. teach that the pressure plate (20) is a heat spreader (col. 6, 11-15). It would have been obvious to one of ordinary skill in the art at

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the time of invention to modify Farnworth by using the pressure plate (20) as a heat spreader as taught by Wood et al. in providing an effective means for dissipating heat generated by the IC die (14).

As applied to claim 6, modified Farnworth teaches that clip (24) and IC die (14) are released from the chuck (32) while the clip (24) holds the IC die (12) in contact with heat spreader (20, Fig. 6B).

As applied to claim 7, modified Farnworth teaches that IC die (14) is bonded with heat spreader (20, Fig. 6B).

As applied to claim 8, modified Farnworth teaches that the clip (32) is removed and disengaged from the clip (24) and heat spreader (20, Fig. 6A).

As applied to claim 9, modified Farnworth teaches that the chuck (32) by means of vacuum transports the IC die (14), which is held to the heat spreader (20) by clip (24) before they are bonded (Fig. 6A, col. 5, lines 10-12).

9. As applied to claim 10, modified Farnworth teaches that IC die (14) and heat spreader (20) held by clip (24) are transported after they are released by the chuck (32, Fig. 6B).

10. Claim 11 is rejected under 35 U.S.C. 103(a) as being unpatentable over Farnworth in view of Fitzgerald et al. (US 6,504,723). Farnworth teaches about all limitations of claim 11 except about reflowing a solder layer to bond the heat spreader (20) to the IC die (14). However, Fitzgerald et al. in disclosing an electronic assembly teach about a heat spreader (30) bonded by solder material (16) to an IC die (14) to

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dissipate the generated heat away from the IC and maintaining functional integrity of the integrated circuit (col. 1, lines 20-25). It would have been obvious to one of ordinary skill in the art at the time of invention to modify Farnworth by using the teaching of Fitzgerald et al. to provide an effective means of bonding the IC die to the heat spreader to reduce or eliminate thermal stresses in the IC die.

11. Claim 11 is rejected under 35 U.S.C. 103(a) as being unpatentable over Farnworth in view of Wood et al. and further in view of Fitzgerald et al. Applicant is referred to the explanation as cited in paragraph (10) above.

### ***Response to Arguments***

12. Applicant's arguments filed on 9/19/2005 have been fully considered but they are not persuasive.

Applicant's Remarks, filed on 9/19/2005 is acknowledged and accepted for the following:

Page 7, lines (1-3), with respect to claims 14 and 18 having been amended and claims 13 and 19-22 having been cancelled and new claim 23 having been added with new independent claims being 1 and 14.

Page 7, lines (5-7) with respect to election of the claims of Group I, amendment of the title and corrections of informalities to the specification.



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13. As for claims 1-3, 5-10, 12, and 14-18, Applicant argues on page 7, paragraphs (5-7) and page 8, paragraphs (1-3), that Farnworth reference and the methods claimed in this application are directed to different purposes. The Examiner respectfully disagrees with the above arguments. The Examiner believes that Farnworth meets the limitations of the claimed invention regardless of the purpose of his teachings.

14. The fact is that Farnworth process provide the same function as the claimed invention. The Applicant argues that Farnworth does not teach certain claim limitations such as "in contact with the clip", "simultaneously", "juxtaposition", and "bonding" throughout his arguments. However, the Examiner considers that all of these limitations have broad meanings and Farnworth indeed meets all of the above-mentioned limitations.

15. Farnworth (Fig. 6B) teaches that the clip (bridge clamp 24 with spring 22) is picked up by the chuck (assembly tool 32 including compression arms 80, 82) when the IC die (14) is picked up. Note that Fig. (6B) clearly demonstrates that clip (24 with 22) is indeed in contact with the IC die (14) through the heat spreader (20). If the Applicant does not agree with the above argument, the Examiner, alternatively argues that Farnworth (Fig. 6B) discloses that the clip (24 with 22) held by Chuck (32 with 80 and 82) holds the IC Die Assembly (IC die 14 and pressure plate 20) with IC Die Assembly being in direct contact with the clip (24 with 22). As an example, The Examiner believes that a coffee cup placed on a coaster on top of a desk is indeed in contact with the desk even if the contact is through the coaster or how else the cup is being supported.

16. Farnworth (Fig. 6B) teaches that the chuck (32 with 80 and 82) is indeed used to place the clip (24 with 22) and the IC die (14) simultaneously (at the same time) into a juxtaposition (next to each other) with the heat spreader (20). Regardless of what Farnworth teaches in Fig. (6A) as far as the positioning of the chuck, clip, heat spreader and IC die is concerned, one of ordinary skill in the art can clearly understand in Fig. (6B) Farnworth meets the simultaneous and juxtaposition limitations as claimed by the Applicant in order to make the assembly of the components possible.

17. Farnworth (Fig. 6B) teaches the limitation of bonding (securely joining of two parts) the IC die (14) while being held by the clip (24 with 22) to heat spreader (20) as they are released from the chuck (32 with 80 and 82).

18. Regarding claim 4, Applicant argues that the limitation "a polymer pad that is part of the clip" is not disclosed by Farnworth as modified by Levert. The Examiner would like to remind the Applicant that the polymer pad as claimed is also NOT an integral part of the clip as is clearly demonstrated in Fig. 3 of the Applicant's disclosure. Therefore, the Examiner believes that Farnworth clearly demonstrates that at time of engagement of all the parts (including clip, heat spreader, die, and substrate), as depicted by Fig. (6B), one skilled in the art can consider the heat spreader (20) and the clip as being part of each other. In alternative, if Applicant does not agree with the above argument, the Examiner considers that Farnworth teaches the above limitation as the spring (22) part of the clip (24) can be made of a resilient material with similar properties as a polymer material and therefore, the clip (24) with resilient pad (22) is in contact with IC die (14) by way of heat spreader (20) as shown in Fig. (6B).

19. Therefore, Farnworth alone and in combination with Wood et al., Fitzgerald et al., and Levert et al. clearly discloses and renders obvious the Applicant's invention as far as the above-mentioned limitations are concerned.

### ***Conclusion***

20. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Sarang Afzali whose telephone number is 571-272-8412. The examiner can normally be reached on 7:00-3:30 M-F.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Peter Vo can be reached on 571-272-4690. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

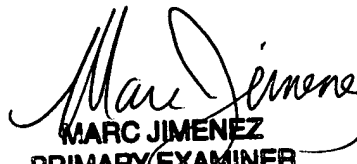
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S.A.

12/08/2005



MARC JIMENEZ  
PRIMARY EXAMINER  
12/9/05